REMARKS

This Amendment is being filed in response to the Office Action dated April 9, 2008. Claims 30-55 are currently pending and stand rejected in the application. Of these, claims 30 and 51 are independent. By this Amendment, claims 30, 43-47 and 51 are amended and claims 56-60 are added. Support for the amendments and new claims can be found at least in paragraphs [0005], [0011], [0014], [0019] and [0029] of the specification as originally filed. Accordingly, no new matter has been added. Accordingly, claims 30-40 and 42-60 remain pending in this application. Applicants respectfully request reconsideration in light of the amendments and comments set forth herein, and respectfully maintain that this application is in condition for allowance.

Telephonic Interview

Applicants note with appreciation the courtesies extended by the Examiner during the telephonic interview on October 8, 2008. During the telephonic interview, Applicants' representative and the Examiner discussed the rejection of the claims and U.S. Patent No. 4,805,989 to Nakajima ("Nakajima"). The Examiner agreed that Nakajima did not disclose photochromic dyes and requested Applicants to submit an amendment adding this or any other claim limitations, after which the Examiner would conduct a search directed to the amended claims. Accordingly, Applicants hereby submit this Amendment wherein the claims include the limitation "photochromic lens comprises photochromic dyes."

Objection to the Specification

The Office Action objects to the specification as lacking antecedent basis for the claim limitation directed to the reflectance of "an amount equal to or greater than about 10% of light in the visible spectrum in a range between 410 and 800 nm." Paragraph [0029] has been

amended herein to include: "As shown in the examples, the reflectance of light in the visible spectrum in a range between 410 and 800 nm is equal to or greater than about 10%." Accordingly, Applicants respectfully request withdrawal of the objection. The Office Action states that such a feature is readable in figures 4-6. Accordingly, no new matter is added.

Rejection Under 35 U.S.C. §112

Claims 41 stands rejected under 35 U.S.C. §112 as not being enabled. Without addressing the correctness of the rejection, in the interest of expediting prosecution, claim 41 has been canceled herein. Accordingly, the rejection has been rendered moot.

Claim Objections

Claims 30 and 46 stand objected because of informalities. By this Amendment, claim 30 was amended to include "an" before "outer" and claim 46 was amended to recite "97%" rather than "297%" as suggested in the Office Action. Accordingly, Applicants respectfully submit that the claim objections have been rendered moot.

Rejection Under 35 U.S.C. §103

All the pending claims stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,805,989 to Nakajima ("Nakajima"). Without addressing the correctness of the rejections, Applicants respectfully maintain that Nakajima fails to teach or suggest the claims as presented herein.

As the Examiner concedes, Nakajima does not teach or suggest a lens part having photochromic dyes. Accordingly, Applicants respectfully submit that Nakajima fails to teach or suggest a lens "comprising photochromic dyes" as recited in independent claims 30, 51, 57 and 59 as presented herein. Support can be found at least in paragraph [0014].

Furthermore, Nakajima fails to teach or suggest a "light-transmitting photochromic lens, visor, mask or screen" as recited in the claims provided herein. In contrast, Nakajima is directed to a mirror, which reflects the light, rather than transmits light therethrough. Accordingly, not only does Nakajima fail to render obvious the invention as claimed, but Nakajima has the opposite and contrary objective to that of the invention. To modify Nakajima to render it "light transmitting" would frustrate and the purpose and objective of Nakajima and render it unsuitable for its intended use. Accordingly, Nakajima teaches away from the invention claimed. As the Manual of Patent Examination Procedures provides in section 2143.01:

> The Proposed modification cannot render the prior art unsatisfactory for its intended purpose.
>
> ...
>
> If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959)

Modifying Nakajima to permit light to be transmitted therethrough would "change the principle of operation" of Nakajima and Nakajima would no longer be suitable for use as a mirror. Accordingly, Nakajima teaches away from such a modification and teaches away from the invention as claimed.

In addition, Nakajima fails to teach or suggest a film coating which "reflects an amount less than about 15% of spectral ultraviolet radiation in a range between 315 and 400 nm and reflects an amount equal to or greater than about 10% of light in the visible spectrum in a range between 410 and 800 nm so that the lens exhibits the visible colored appearance".

According to Nakajima, in fact, the disclosed reflectance characteristics are a property of an object, the back reflecting mirror as a whole, which includes not only the

dielectric multi-layered coating but also a light-absorbing layer and as such, is unable to transmit light at all. In this regard, the Examiner's attention is drawn to various discussions in Nakajima:

> FIG. 4, 5 6 and 7 are spectral reflection characteristic diagrams **for a reflector mirror** according to various respective embodiments of the present invention. (emphasis added) (Col. 3, lines 42-44)
>
> The spectral reflecting characteristics **of the resulting multi-layered back reflecting mirror are shown in FIG. 4**, from which one can see the following: compared with the conventional multi-layered back reflecting mirrors, the **mirror** of Example 1 has a greater degree of freedom from glare since the **reflectance in the range of 480-550 nm** having a high value of the product of spectral luminous efficiency for dark adaptation and the spectral energy of a headlight is reduced; secondly, the visibility of this **mirror** is increased since the **reflectances in the ranges of 430-480 nm and 580-700** nm for blue and red, respectively, which have lower levels of brightness to the human eye than green are increased. (emphasis added) (Col. 5, lines 8-21)
>
> As is clear from FIG. 5, this multi-layered back reflecting **mirror** had **spectral reflection characteristics** that were similar to those of the mirror produced in Example 1. (emphasis added) (Col. 5, lines 65-68)
>
> As is clear from FIG. 6, the multi-layered **back reflecting mirror** of Example 3 had **spectral reflection characteristics** that were similar to those exhibited by the mirrors prepared in Examples 1 and 2. (emphasis added) (Col. 6, lines 47-50)

In col. 7, line 18 to col. 8, line 22, Nakajima also makes it clear that the spectral characteristics mentioned by the Examiner are in fact characteristics of an object, the ***back reflecting mirror as a whole***, which is unable to transmit light.

Regarding dependent claims 43-47, an activation value is a parameter of a photochromic lens, and not of a multi-layer film. The photochromic dyes in the lens part imparts the activation value onto the lens. The multi-layer film does not. Claims 43-47 have been amended to recite "photochromic range" rather than "activation value" for clarification. As provided in paragraph [0019], Activation is also called "Photochromic Range" and accordingly

no new matter is added. As clarified in the attached excerpts from European Standard EN1836, photochromic range is:

> range given by the ratio of the difference of the luminous transmittance in the faded state t_0 and the luminous transmittance in the darkened state t_1 to the luminous transmittance in the faded state t_0:

As one of ordinary skill would appreciate, a photochromic range is imparted by photochromic dyes, which provide the faded state and darkened state of a lens. Thus, the Examiner's assertion that the activation value of a film can be adjusted by adjusting the number and thickness of layers is technically incorrect. Accordingly, the features as claimed would not have been inherent or obvious to one of ordinary skill in the art based on the multi-layer film of Nakajima, which does not disclose or suggest the use of photochromic dyes, which the Examiner conceded, and therefore does not disclose or suggest a photochromic range as claimed.

Regarding new claim 56, the method of forming a photochromic lens by forming a lens part and providing photochromic dyes is described at least in paragraph [0014] and hence no new matter is presented. Nakajima, which is directed to a mirror which lacks photochromic dyes, fails to teach or suggest such a method.

New claim 57 is directed toward a photochromic sunglass lens, an ophthalmic lens, a visor or a mask, support for which can be found at least in paragraphs [005] and [0011]. As one of ordinary skill in the art would understand, a photochromic sunglass lens, an ophthalmic lens, a visor or a mask is worn near the eye. Merriam-Webster's Online Dictionary defines ophthalmic as "of, relating to, or situated near the eye" and visor as "a projecting front on a cap or headband for shading the eye." It also defines a mask as "a cover or partial cover for the face used for disguise" and sunglasses as "glasses to protect the eyes from the sun." Whereas the

definition is directed to the plural "sunglasses," one of ordinary skill in the art would understand that a "sunglass lens" is a lens of sunglasses. Examples of the use of the term "sunglass lens" as a lens for sunglasses can be found at least at http://www.accc.gov.au/content/index.phtml/itemId/614116/fromItemId/692835 and http://www.allaboutvision.com/lenses/photochromic.htm, a copy of both of which is enclosed.

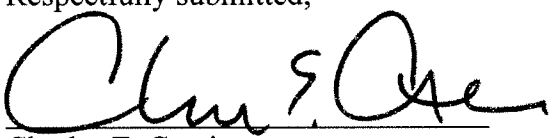
Accordingly, one of ordinary skill in the art would understand that "a photochromic sunglass lens, an ophthalmic lens, a visor or a mask" is an optical device positioned near, more specifically, in front of the eye. Accordingly, one side of the lens would face the eye and the opposite side would face away from the eye. Thus, no new matter is added.

New claim 59 is directed toward a photochromic screen, support for which can be found at least in paragraphs [0011].

At least for the reasons set forth above, Applicants respectfully maintain that claims 30-40 and 42-60 are patentable over Nakajima and thus request withdrawal of the rejection. Applicants respectfully submit that all outstanding rejections have been addressed and are now either overcome or moot and submit that all of the claims remaining in the application are in condition for allowance. Applicants respectfully request entry of this Amendment, and early and favorable action in the above-identified application.

No fee, other than the three month extension fee, is deemed necessary in connection with the filing of this Amendment. However, if any additional fee is required, the Examiner is hereby authorized to charge the amount of such fee to Deposit Account No. 19-4709.

Respectfully submitted,



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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1836

September 2005

ICS 13.340.20

Supersedes EN 1836:1997

English Version

Personal eye-equipment - Sunglasses and sunglare filters for general use and filters for direct observation of the sun

Équipement de protection individuelle de l'oeil - Lunettes solaires et filtres de protection contre les rayonnements solaires pour usage général et filtres pour observation directe du soleil

Persönlicher Augenschutz - Sonnenbrillen und Sonnenschutzfilter für den allgemeinen Gebrauch und Filter für die direkte Beobachtung der Sonne

This European Standard was approved by CEN on 28 July 2005.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 1836:2005: E

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 165:1995 and IEC 60050-845:1987 and the following apply.

3.1
absorptance (absorption)
absorptance is the difference 1 minus transmittance minus reflectance

NOTE Some manufacturers use the term absorption and specify the value of the absorption as the difference 1 minus the luminous transmittance.

3.2
degree of polarisation, *P*
defined as:

$$P = \frac{\tau_{pmax} - \tau_{pmin}}{\tau_{pmax} + \tau_{pmin}}$$

where

τ_{pmax} is the maximum values of luminous transmittance as determined with linearly polarised radiation;

τ_{pmin} is the minimum values of luminous transmittance as determined with linearly polarised radiation.

3.3
luminous transmittance of photochromic sunglare filters
five different values of the luminous transmittance of photochromic sunglare filters are defined by this European Standard:

τ_0 luminous transmittance in the faded state as reached at 23 °C after specified conditioning;

τ_1 luminous transmittance in the darkened state as reached at 23 °C after specified irradiation simulating mean outdoor conditions;

τ_w luminous transmittance in the darkened state as reached at 5 °C after specified irradiation simulating outdoor conditions at low temperatures;

τ_s luminous transmittance in the darkened state as reached at 35 °C after specified irradiation simulating outdoor conditions at high temperatures;

τ_a luminous transmittance in the darkened state as reached at 23 °C after specified irradiation simulating reduced light conditions.

3.4
photochromic range, R_p
range given by the ratio of the difference of the luminous transmittance in the faded state τ_0 and the luminous transmittance in the darkened state τ_1 to the luminous transmittance in the faded state τ_0:

$$R_p = \frac{\tau_0 - \tau_1}{\tau_0}$$

3.5
photochromic sunglare filter
filter that reversibly alters its luminous transmittance under the influence of sunlight

NOTE This alteration is not instantaneous, but is a function of a temperature and material dependent time constant. In this way, the luminous transmittance of the filter adjusts itself within certain limits to the ambient radiant flux.

3.6
polarising sunglare filter
filter of which transmittance is dependent on the polarisation of the radiation

NOTE Polarising sunglare filters have a preferred plane of polarisation. The plane of polarisation is determined by the transmission direction and the magnetic vector of the transmitted electromagnetic wave.

3.7
reference points
reference points of eye-protectors with afocal lenses are defined in EN 167:2001 by the points where the two light bundles are passing through the oculars, unless the manufacturer specifies different ones (e.g. in the case of frames for children). The boxed centre (see Figure 5) of the ocular takes the place of the reference point if this is not known and cannot be determined by using this method

3.8
relative visual attenuation coefficient (quotient) for signal light recognition
quotient Q is defined as:

$$Q = \frac{\tau_{sign}}{\tau_v}$$

where

τ_V is the luminous transmittance of the sunglare filter for CIE standard illuminant D 65. See ISO/CIE 10526;

τ_{sign} is the luminous transmittance of the sunglare filter for the spectral power distribution of the traffic signal light.

Sunglasses and fashion spectacles —April 2003

Introduction

A Trade Practices Act mandatory standard for sunglasses and fashion spectacles, based on Australian Standard 1067-1983, came into effect on 1 July 1985 and has been in place since then. The standard established requirements in such important aspects of eye health as:

- transmission limits for visible, infra-red and ultraviolet radiation
- the relative transmission of different visible wavelengths
- the dimensions and strength of lenses and frames
- colouration standards for the lenses
- the labelling of sunglasses including, among other things, warnings that sunglasses may be unsuitable for use by people with defective colour vision,

particularly when driving
optical quality of the lens.

The current standard, which is based on Australian Standard 1067.1 —1990, came into effect on 18 March 1998 and is due to expire on 30 September 2003.

The standard aims to ensure that sunglasses and fashion spectacles provide adequate protection from the outdoor environment, particularly from ultraviolet radiation, thereby reducing the risk of damage to eyesight.

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Identification of the problem

What is the problem being addressed?

The safety issues relating to sunglasses are outlined below.

Solar ultraviolet light causes cataracts

Long term exposure to solar ultra violet radiation is a risk factor for cataracts, a very common eye disorder that results in loss of vision. The prevalence of significant cataracts is 25 per cent in people aged 65-74 and over 40 per cent in those aged more than 75 years.

Cataract surgery imposes a very significant annual cost on the community. Over 120 000 cataract operations are performed in Australia each year. Australia's cataract surgery rate is 6 300 per million, which is higher than the USA and the UK. About 0.3 per cent of the population suffers from blindness due to cataracts.

There are delays in access for cataract surgery at public hospitals which means that people with cataracts often drive for several years with less vision than desirable for safe driving. People whose work

or recreation is associated with long term exposure to sunlight are strongly advised to wear sunglasses that absorb ultra-violet radiation across the whole of the UV spectrum but especially in the UV B region. The problem is how will they know that the sunglasses they purchase will absorb UV satisfactorily if there is no legislative requirement for sunglasses to do so and no legislative requirement for consumer labelling.

Radiation transmission standards

Transmission standards are important because there are significant radiation hazards in sunlight that consumers would expect sunglasses to eliminate.

Solar radiation can be divided into three components in relation to sunglasses: visible light, infra-red radiation, and ultraviolet radiation.

Visible light poses little hazard to the eyes at the levels commonly encountered, although long term exposure to short wavelength (blue) light has been implicated in the development of age related macular degeneration. Sunglasses are principally used to reduce glare, which is caused by high levels of visible light or by light in inappropriate places.

Infra-red radiation has wavelengths longer than visible light, and poses little hazard to the eye, as the amount reaching the eye under normal conditions is low. Protection against infra-red radiation is mainly required by people working in industries in which they receive a high exposure, such as people working with molten metals.

Ultraviolet radiation has wavelengths shorter than visible light. Exposure to high levels of environmental ultraviolet radiation is common in

Australia. In addition to the well known association between ultraviolet exposure and melanoma, chronic exposure to ultraviolet radiation has been implicated in serious eye disorders including cataract, pterygium and age related macular degeneration. Acute exposure to intense ultraviolet radiation can produce photokeratoconjunctivitis (sometimes known as snow blindness).

Coloured sunglasses can reduce the ability to see traffic light signals

Highly coloured sunglasses can reduce the ability to see road traffic signal lights. For example, a green sunglass lens absorbs red light as a result of which red traffic light signals become more difficult to see at a safe distance.

Neodymium doped glass lenses sometimes used for sunglass lenses absorb light in a narrow band range (35nm) centred on 580nm. This is the wavelength of yellow LEDs used for variable message displays on roads and for other signalling purposes. This is a very selective absorption of light and the ordinary consumer would not be able to evaluate sunglasses for performance in this wave length at the time of purchase.

Highly coloured sunglass lenses may distort signal colour increasing the risk of incorrectly identifying the signal colour. This has implications for car drivers and is even more critical for train drivers, navigational watch keepers on ships and pilots of aircraft.

For these reasons there should be some limits on the colouration of sunglass lenses or at the very least sunglasses which have highly selective absorption properties

should carry a prominent warning label.

Sunglasses that are too dark are unsafe for driving

Very dark sunglasses can reduce the ability to see safely and should not be worn when driving, flying or as a pedestrian on the road. Such sunglasses should carry a warning label and extremely dark sunglasses should not be supplied.

Sunglasses should not be made of flammable materials

Sunglasses that easily ignite or have rapid flame propagation should not be supplied. Such glasses could cause serious eye and facial burns if accidentally ignited eg: when lighting a cigarette.

Sunglasses should be robust enough to minimise the risk of eye injury

Lenses that break easily can cause a secondary eye injury due to flying particles from the broken lens damaging the cornea of the eye or penetrating the eye. The US has a legislative requirement for impact resistance for all ophthalmic lenses.

Hazards associated with dimension and strength of frames

The Australian Standard includes requirements for the minimum dimensions of sunglass lenses. This is important as small lenses do not provide adequate protection, due to the amount of UV radiation that can pass around the edges of the lenses. Current overseas fashions for very small lenses make this requirement particularly important.

Consumers need information to make informed choices

Consumers are not able to judge the qualities of sunglasses that relate to safety.

They cannot:

- tell whether a lens absorbs ultraviolet light because UV radiation is invisible
- be expected to know that sunglasses with highly coloured lenses may reduce their ability to see traffic signals
- tell whether the material of the sunglass is flammable.

Even professional retailers of sunglasses such as optometrists and optical dispensers are unable to advise on these properties without information being provided to them by the manufacturer since they do not have access to the necessary testing equipment.

Consumers need information on the properties of sunglasses to make informed purchases. They need assurances that unsafe materials have not been used (e.g.: frames made from flammable materials, lenses that are liable to shatter).

When manufacturers make special claims for their sunglasses, those claims should be based on an agreed test method, so that it is evident that the claim is well based and so valid comparisons can be made by consumers. The Australian/New Zealand Standard sets out the basis on which special claims should be made. This covers claims about UV absorption, blue light absorption and colouration properties.

Professor Stephen Dain, Head, School of Optometry, University of New South Wales, provided expert evidence in court proceedings instituted by the Australian Competition and Consumer Commission (ACCC) against a fast food chain. The proceedings related to the promotion and sale of sunglasses which failed the mandatory product safety standard

by not carrying a warning labelling them as not suitable for use while driving.

In his affidavit, Professor Dain stated:

> *'In general terms, the Australian Standard recognises that people buy sunglasses mainly to protect themselves against glare and ultraviolet radiation. At the same time, the Australian Standard is designed to ensure that, in satisfying those two needs, further problems are not introduced by the lenses. This would include problems relating to the refractive requirement of the lenses, such as distorting vision or making vision blurred or uncomfortable, and potential hazards from sunglasses relating to issues of coloration and luminous transmittance.'*
>
> *'Even for an experienced person it is not possible to tell simply by looking at a pair of sunglasses what level of luminous transmittance the sunglasses have. Nor is it possible to tell by looking at sunglasses whether they would be dangerous for driving. It is, therefore, out of the question for a member of the public to make such a judgement. For this reason standards on sunglasses require sunglasses with a luminous transmittance less than 8 per cent to be marked as not suitable for driving.'*
>
> *Australian Competition and Consumer Commission v Hungry Jack's Pty Ltd (1996) ATPR 41-538 (Carr J) p 41-538.*

Price is not an assurance of safety

Consumers cannot rely on price as an indicator of quality. Past enforcement experience shows that some very high priced sunglasses do

not necessarily conform to the Australian Standard.

The Australian Competition and Consumer Commission (ACCC) has provided an internal guide describing the safety hazards involved with failures of the standard which clearly illustrates the nature of the problem. This is at **attachment A**.

Why is government action needed to correct the problem?

Australia has some of the harshest sun conditions in the world with long hours of strong sunlight for most of the year and a thinning of the ozone layer over the southern part of the country that results in higher ultraviolet light levels. Government action is needed for the reasons listed below.

Increased numbers of non-conforming sunglasses. Without a mandatory standard and with no consequent requirement to test sunglasses for compliance with the Australian Standard there would be a risk that the non-conforming sunglasses will swamp conforming sunglasses. There are huge varieties of sunglasses available overseas, many of which do not conform to existing standards. In addition it would be likely that many small importers with no knowledge of the technical aspects of sunglasses and no understanding of existing standards would see import opportunities in the field. Without a mandatory standard the number of below standard products could quickly swamp the market and the safety of the community will be compromised. Unisearch, which has provided a testing and calibration service to industry for over 20 years, have advised that from a random sample of

imported sunglasses, where the importer does not have the skill to screen out obvious failures, they have come to expect a failure rate of around 40 per cent. The failures are mainly in the area of public health, rather than the trivial and technical.

Consumers cannot differentiate. It is impossible for consumers to judge whether or not a pair of sunglasses provides adequate protection from ultraviolet radiation. There is no correlation between lens colour of sunglasses and the amount of protection provided from ultraviolet radiation or cost of sunglasses and the amount of protection provided from ultraviolet radiation. A person can be easily deceived into thinking that a pair of sunglasses provides adequate protection from ultraviolet radiation because the lenses appear to be a dark shade. It is not uncommon for a very dark lens to have little effect on the amount of ultraviolet radiation reaching the eyes. Australian consumers currently have an expectation that sunglasses do provide them with the protection that is required and will not make further inquiries as to the protective properties of the lenses, particularly as a mandatory standard has been in place for many years.

Retailers cannot differentiate. Retailers of sunglasses cannot differentiate between sunglass lenses that meet the standard any better than consumers without proper measuring instruments. The vast majority of retailers (including optometrists) do not possess the devices needed to measure ultraviolet absorption of the lenses and rely on the force of the legislation to ensure the standards

are met. Both the retailer and the purchaser of sunglasses must rely on the manufacturer's or importer's assurance that the sunglasses do provide adequate protection.

Road Safety. People wearing sunglasses that do not meet the colouration standards will often have difficulty seeing road signs and safety signals and are placed at considerable risk of accident. It is likely that sunglasses that are unsafe for driving and currently prohibited from sale would reappear on the market if the mandatory standard was removed. These sunglasses could truthfully be marketed as blocking out all ultraviolet light without mentioning or explaining that they should not be worn when driving. It is unreasonable to expect consumers to understand risks associated with the colour of lenses and government regulation is arguably necessary on these grounds.

Personal safety. Lenses of different colouration density can affect the wearer's depth perception and increase the risk of falls or other accidents. It is unreasonable to expect the average consumer to understand that this is the case.

Size. Consumers often regard sunglasses as fashion items rather than for eye protection. In recent years, the trend in spectacle and sunglass fashions has been towards smaller lenses. In many cases, these lenses would not provide adequate protection; however, the standard requires a minimum lens size which ensures that sunglasses provide adequate cover.

Climatic conditions. Australians have more exposure to sunlight and consequently UV radiation

than in Europe and Canada and more than most areas of the United States. No European country encounters similar conditions and has the same need for sunglass protection as Australia. Australia is unique in this regard and the community requires additional safeguards.

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Objectives

What are the objectives of government action?

The Government's consumer protection policy includes the objective of ensuring that consumer products are safe. The Trade Practices Act includes provisions to support this objective through the establishment of mandatory consumer product safety and information standards, product bans, recall of unsafe products and the issuing of product safety warning notices.

In the case of sunglasses, the Government's aim is to protect the eye health of Australian consumers by ensuring that sunglasses meet specified safety requirements, and, through labelling requirements, to assist consumers to select appropriate, safe sunglasses which provide protection from ultraviolet radiation.

Is there a regulation currently in place? Who administers it?

A Trade Practices Act mandatory standard for sunglasses and fashion spectacles came into effect on 1 July 1985 and has been in place since. The standard established requirements in such important aspects of eye health as upper limits on ultraviolet radiation, optical characteristics, robustness and lens retention, lens curvature and thermal stability, mechanical

strength of frames, resistance to flame propagation and colouration limits.

The current standard, which is based on Australian Standard 1067.1-1990 came into effect on 18 March 1998 and was due to expire on 31 December 2002. However, in the initial round of consultations Treasury received a comprehensive range of submissions and the arguments for and against the continuation of the standard were very finely balanced. The arguments related to both consumer protection and competition policy issues. Accordingly, Treasury considered it would be necessary to seek and analyse the views of a much wider range of stakeholders before reaching a conclusion. Accordingly, as a temporary measure the standard was re-gazetted for a period of nine months with an expiry date of 30 September 2003.

The standard is enforced by the Australian Competition and Consumer Commission (ACCC).

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Options

There are two options that might be considered viable at the national level concerning sunglasses:

Option 1: Industry self regulation

Industry self regulation is voluntary action by industry to control the supply of particular products for the benefit of consumers. Arguments for and against self regulation have been put forward by affected parties, and these are summarised in the 'Consultation' section of this regulation impact statement.

Option 2: Government regulation

The mandatory standard would reference AS/NZS 1067 2003, which

is the most recent version of the Australian Standard.

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Impact analysis

The proposed options would affect consumers who purchase sunglasses, industry bodies involved in the supply of sunglasses (importers, distributors and retailers) and government (including consumer product regulators and providers of public hospital services).

Option 1: Industry self regulation

Costs

Consumers

The real cost to consumers would be the possibility of sunglasses which do not comply with the Australian Standard swamping the market thus compromising consumer safety.

Without regulation, consumers would have imperfect information to discriminate between generally cheaper products rating only as 'fashion spectacles' in the current standard and products that offer a high level of eye health protection. It is then entirely possible that there will be a drift in the current sunglass range to lower standards, as producers seek to appeal to consumer fashion and price preferences once the regulated requirements are removed.

Consumers would be unable to judge whether or not a particular pair of sunglasses provides adequate protection from ultraviolet radiation.

Apart from UV protection, the requirement to adhere to strict colour requirements would no longer apply and therefore could lead to poor colouration of lenses. This could become a road safety hazard, particularly in relation to traffic

lights.

Lenses of different colouration density can affect the wearer's depth perception and increase the risk of falls or other accidents. Consumers would not be able to identify this hazard.

Consumers would also be likely to suffer more eye health problems, such as cataracts.

Industry

Retailers of sunglasses cannot differentiate between sunglass lenses that meet the standard any better than consumers without the proper measuring instruments. The vast majority of retailers (including optometrists) do not possess the devices needed to measure ultraviolet absorption of the lenses and rely on the force of the legislation to ensure that standards are met.

Consequently retailers will not be able to confidently sell quality sunglasses that are recognised as safe for consumers.

Government

There would be increased health risks borne by consumers, including the higher probability of traffic accidents and falls, and therefore health authorities would be facing greater costs. The National Health and Medical Research Council (NHMRC) has estimated that a 1 per cent increase in exposure to ultraviolet radiation would result in a 14 per cent increase in the incidence of pterygium (benign lesions that can be found on either side of the cornea) and a 0.8 per cent increase in cortical cataracts. Reducing ocular exposure to ultraviolet radiation would have a significant effect on the incidence of these conditions. The only effective treatment for these

conditions is surgery to remove the cataract or pterygium.

These conditions impose a considerable cost on the community, both through direct costs of treatment and the indirect costs of poor vision. For example, in the 2001—2002 financial year, the NHMRC estimate of the direct cost to the Commonwealth (through medicare benefits) of treating cataracts was over $45 million. Treating pterygia cost almost another million dollars. These figures do not include the cost of anaesthesia, hospital stays, additional fees charged by surgeons or other incidental expenses.

Benefits

Consumers

Consumers would benefit from access to the wide variety of fashionable sunglasses that are available overseas. However, it seems unlikely that they would benefit from lower prices since the testing authority has advised that the existence of a mandatory standard does not seem to have had any effect on sunglass prices.

Industry

Industry would benefit from the removal of restrictions to fashion design and access to worldwide best sellers which currently do not meet the requirements of the Australian Standard. They would also benefit from being able to provide consumers with what they want, and what is available elsewhere in the world, in a timely manner.

Government

The cost of enforcing compliance with the mandatory standard would be eliminated. However, as one stakeholder observed, the cost of regulation is relatively small.

Option 2: Government regulation

Costs

Consumers
There would be no costs to consumers if government regulation is adopted, since testing authority records show that the requirement to comply with the mandatory standard does not seem to have a significant effect on retail prices.

Industry
Some sectors of industry, particularly small business, would incur compliance testing costs. However, large companies such as OPSM, Big W, Sunglass Hut etc. require evidence of compliance with the Australian Standard and would continue to do so whether the standard is mandatory or not.

Government
The Australian Competition and Consumer Commission (ACCC) has provided an estimate of enforcement costs of approximately $25 000 per annum based on visual compliance check, purchase and testing of products and representation on the Standards Australia Committee.

As part of the ACCC's product safety survey program, ACCC regional offices have regularly conducted random surveys of sunglasses and fashion spectacles in retail outlets to detect non complying products and assess the level of marketplace compliance. The ACCC has also investigated alleged breaches of the mandatory standard which have been brought to its attention by complaints from consumers, sunglass suppliers or the media.

For the period 1996—2002, 18 surveys of sunglasses and fashion spectacles have been conducted by ACCC regional offices. These have

been visual surveys only with the focus on appropriate labelling, density matching and even gradient tint, and compliance with the field of view requirements (or minimum eye coverage measurements). Where breaches of the standard have been suspected, products have been purchased for testing purposes and appropriate enforcement action has been taken. Enforcement action has also been taken in cases where alleged breaches of the standard have been brought to the ACCC's attention and have been substantiated.

A summary of enforcement actions taken since 1996 has been provided by the ACCC at a**ttachment B**.

The ACCC has advised that while it is difficult to provide statistical information on the level of compliance, the following comments would generally apply:

- The nature of the sunglasses market does present particular challenges in enforcement. The ranges of products and suppliers are extensive and continually changing. There will always be a percentage of the market that does not comply but overall surveys indicate compliance levels to be good.
- The compliance level is generally higher at the upper end of the market given the large number of sunglasses sold in the marketplace. Some concern has been expressed about the level of compliance with products sold at the lower end of the market (i.e.: discount variety stores). However this appears to vary from state to state.
- Price is not really an indication of compliance and it has been found that many cheaper priced sunglasses do comply with the standard.

Benefits

Consumers

Consumers would benefit from access to a wide range of sunglasses which afford adequate protection from ultraviolet radiation and do not distort vision. The labelling requirements of the standard would enable consumers to make an informed choice and select the most appropriate sunglasses for their intended use.

Industry

Retailers would benefit from the assurance that the sunglasses they sell provide adequate protection and meet the requirements of the standard, and the consequent protection against public liability claims.

Government

The protection afforded by compliant sunglasses should reduce the incidence of eye diseases, and of accidents associated with distorted vision (road accidents and falls) and thus reduce the cost of health care.

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Consultation

Consultations have been held with consumers, industry, government, health professionals and academic stakeholders. Specifically Treasury consulted with the following:

- The Consumer Product Advisory Committee (CPAC) (state, territory and New Zealand Consumer Affairs/Fair Trading officers)
- The Australian Competition and Consumer Commission
- Commonwealth Consumer Affairs Advisory Council
- Professor Barry Cole, Department of Optometry and Vision Sciences, University of Melbourne

- Professor Alan Coates AM, Chief Executive Officer, The Cancer Council Australia
- Dr Stephen Dain, Director, Optics and Radiometry Laboratory, School of Optometry and Vision Sciences, University of New South Wales
- The Guild of Dispensing Opticians
- The Royal Australian and New Zealand College of Ophthalmologists
- Australian Retailers Association
- The Optometrists Association Australia
- The Pharmacy Guild of Australia
- Consumers' Federation of Australia
- Sunglass Association of Australia
- Safilo Australia
- Oakley South Pacific Pty Ltd
- Gibson Importing Co (Aust.) Pty Ltd
- Optical Disk Manufacturing Association
- Luxottica Group
- Members of Standards Australia Committee CS-053 Sunglasses and Fashion Spectacles

The views of all interested parties are summarised briefly below, divided for clarity into two sections:

- arguments for the retention of a mandatory standard
- arguments against the retention of a mandatory standard.

Arguments for the retention of a mandatory standard

- Without a mandatory standard, non-conforming sunglasses will swamp conforming sunglasses and the safety of the community will be compromised. Poor quality, non-protective sunglasses will be sold causing damage to consumer's eyes.
- It is impossible for consumers to

judge whether or not sunglasses provide adequate protection from ultraviolet radiation. There is no correlation between lens colour and cost of sunglasses and the amount of protection provided. Australian consumers have an expectation that sunglasses do provide them with the protection that is required and will not make further inquiries into the protective properties of the lenses, particularly as a mandatory standard has been in place for many years.

Retailers of sunglasses cannot ascertain whether sunglass lenses meet the standard any better than consumers without proper measuring instruments. The vast majority of retailers (including optometrists) do not possess the devices needed to measure ultraviolet absorption of the lenses and rely on the force of the legislation to ensure the standards are met.

People wearing sunglasses that do not meet the colouration standards will often have difficulty seeing road signs and safety signals and are placed at considerable risk of accident. It is likely that sunglasses that are unsafe for driving and currently prohibited from sale would reappear on the market without a mandatory standard.

Sunglasses could be marketed as blocking out all ultraviolet light without mentioning that they should not be worn while driving. It is unreasonable to expect consumers to understand risks associated with the colour of lenses and government regulation is necessary on these grounds.

Lenses of different colouration density can affect the wearer's depth perception and increase the risk of falls or other accidents. It is

unreasonable to expect consumers to understand that this is the case and accordingly a mandatory standard is necessary.

In recent years the fashion trend in spectacles and sunglasses has been towards smaller lenses. The current standard, which requires a minimum lens size, ensures that sunglasses will provide adequate cover.

Australia has some of the harshest sun conditions in the world with long hours of strong sunlight for much of the year and a thinning of the ozone layer over the southern part of the country that results in higher ultraviolet light levels. No European country encounters similar conditions and has the same need for sunglass protection as Australia. Australia is unique in this regard and the community requires additional safeguards.

The absence of regulation in other countries is not an indication that self regulation does work in relation to sunglasses. The fact that large numbers of people are not complaining of problems due to poor sunglasses does not indicate that there is not a problem as cataracts and other effects of UV exposure are often not apparent until years later and the link between the injury and sunglasses is not obvious.

There is no evidence that the current mandatory standard has led to any restriction on competition. An enormous range of sunglasses that comply with the standard is available from countless outlets ranging from supermarkets to specialist stores.

Retention of the current regulation is required because many manufacturers of sunglasses are unlikely to comply with the standard unless they are compelled to do so.

Voluntary compliance clearly is not happening in Europe, it is just that the authorities are ignoring the situation. ORLAB (a testing agency) sees substantial numbers of sunglasses with the CE marking that do not comply with the mandatory standard or with the European standard. 40 per cent of sunglasses submitted for testing fail the requirements of the mandatory standard, mainly in the significant areas for public health rather than the trivial and technical. If the standard is allowed to lapse, more non-complying sunglasses would come on the market.

Arguments against the retention of a mandatory standard

The only suppliers testing their products correctly and complying with the standard are those who sold only the best quality in the market prior to the introduction of the standard. Unlabelled and harmful sunglasses are still on sale through market stalls, service stations, etc.

Claims that the standard has never been effectively enforced.

Reputable companies who spend a considerable amount on sunglass testing annually will continue to test their sunglasses whether the standard is mandatory or not. Trading with customers such as OPSM, Big W, Sunglass Hut etc means that quality assurance must be guaranteed by test results. Also larger, high profile companies will always want compliance with the standards to protect against public liability claims should they ever occur.

What benefit to the industry and consumer protection is the mandatory standard if it has never eliminated non-compliant products and only hindered the more

responsible companies from controlling more of the marketplace by increasing their costs and reducing their competitive edge against those who are never brought to task.

The 'field of view' requirements are restricting trade with worldwide best sellers, which are available in over 70 countries. This has the economic impact of restricted trade and inhibits international branding. Furthermore, sunglasses which do not comply with these requirements are readily available on the market.

There has been no injury data demonstrating eye complications caused by sunglasses over the last 15 years.

Sunglasses produced to the European Standard are safe and high quality and should be allowed to be sold.

The European Standards are a necessary guideline for every manufacturer who wishes to sell sunglasses on the European market, since they are the most recent international standards and guarantee the safety of the sunglass wearer. The European Standards also require that each sunglass carry within its packaging an informative note which illustrates the specifications of the product (recommended use, suitability for driving, type of lenses, maintenance).

Overseas standards, while comprehensive and responsible, are not mandatory.

The vast majority of sunglasses available anywhere in the world meet Australia's standard for UV absorption. By its nature the material used in sunglass lenses is a highly effective UV filter and you will very rarely experience any testing failure for UV absorption

limits.

There is only one laboratory in Australia which provides NATA approved testing, which prevents the industry from supplying in a timely fashion a product which the consumer clearly wants, and should be able to access more quickly.

Of the many instances where sunglasses have had to be recalled from sale the vast majority have been for technical breaches of the standard which did not represent a public health risk.

The current mandatory nature of the standard acts as an impediment to industry providing the consumer with what they want, and what is available elsewhere in the world, in a timely manner.

A voluntary standard and self regulation will achieve a marketplace where consumers are comfortable that they are buying a quality product, but where they have equal access to a product that is available in every other country in the world. Market forces will ensure that responsible suppliers and retailers will continue to do what they have done in the past.

The adoption of the European Standard in Australia, on a voluntary or mandatory basis, would guarantee and inform correctly the final consumer and contribute to increase the efficiency of the Australian business operators and lead in the medium term to a possible decrease in prices and increase in employment.

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Conclusion

On balance the arguments for retaining a mandatory standard for sunglasses outweigh the arguments

against retention. The principal reasons for the adoption of the mandatory standard in 1985 have not changed. The standard aims to ensure that sunglasses and fashion spectacles provide adequate protection from the outdoor environment, particularly from ultraviolet radiation, thereby reducing the risk of damage to eyesight. The standard establishes requirements in such important aspects of eye health as:

- transmission limits for visible, infra-red and ultraviolet radiation
- the relative transmission of different visible wavelengths
- the dimensions and strength of lenses and frames
- colouration standards for the lenses
- the labelling of sunglasses including, among other things, warnings that sunglasses may be unsuitable for use by people with defective colour vision, particularly when driving
- optical quality of the lens.

A number of stakeholders claimed that the mandatory standard has never been effectively enforced and support this claim by pointing to the number of non-compliant products on the marketplace. However the information on enforcement action supplied by the ACCC at **attachment B** demonstrates that very effective enforcement action has been taken. The ACCC has advised that ensuring compliance is difficult because the size of the market is so extensive and the range of outlets at which these products are sold is so varied. There is also concern where unincorporated street vendors or market traders are found to be selling sunglasses which do not comply with the mandatory standard because they fall outside the jurisdiction of the Trade Practices

Act. However, where States have complementary standards (NSW, QLD, SA and WA), the ACCC liaises closely with the fair trading agencies in those States to pursue these breaches.

The technical nature of the standard and the fact that compliance with most of the standard's requirements is unable to be judged unless the products are tested by an accredited testing agency also has a large impact on enforcement of the standard.

Australia has some of the harshest sun conditions in the world with long hours of strong sunlight for most of the year and a thinning of the ozone layer over the southern part of the country that results in higher ultraviolet light levels. Consequently consumers in Australia are exposed to greater health risks and the community requires additional safeguards.

With self regulation it is likely that the market would be swamped with non-conforming sunglasses and consumers would be exposed to increased health risks including cataracts and other tumours and the higher probability of traffic accidents and falls.

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Recommended option

The recommended option is therefore to retain a mandatory standard under the Trade Practices Act for sunglasses and fashion spectacles.

Implementation and review

The mandatory standard will be implemented by a notice in the Commonwealth Government Gazette, to take effect from date of publication. The gazette notice will call up AS/NZS 1067 2003. To avoid

disadvantaging suppliers, it is proposed that both the old standard, which called up AS1067.1 1990, and the new standard, which calls up AS/NZS 1067.1 2003, will apply concurrently for twelve months. A copy of the draft notice is at **attachment C**.

Treasury has a policy of making mandatory only the essential safety features of standards. However the sunglass standard is highly complex and technical and all the specifications in the standard are inter-related. For this reason, the only practical solution is to make the majority of the standard mandatory.

The sunglass market is very volatile and fashions are constantly changing. Consequently the standard will be reviewed on a regular basis at least every five years or more probably sooner if changes to the marketplace make review imperative.

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Attachment A

Safety hazards arising from failure to meet the standard

The mandatory standard for sunglasses contains a number of specifications for the safe design and manufacture of sunglasses sold in Australia. Within the standard, failures to meet some of the specifications represent greater hazards than others.

Serious failures

Ultraviolet transmittance

Means the glasses do not effectively filter UV rays from reaching the eye and could result in retinal damage and long-term damage to the eye.

Absence of warning labels

The warnings are either for driving

or people with colour defective vision and failure to carry these warnings could represent severe hazards.

Light transmittance
A low value means the glasses are too dark and do not let enough light through for safe use in certain conditions.

Field of view
Means the lenses are too small in size and restrict the field of vision, which could be significant if the glasses were used for driving. The lenses also permit light and UV around the edges of the sunglasses. This could result in retinal damage or long-term damage to the eye.

Refractive and prismatic
Values too large will result in the wearer experiencing one or all of the following: blurred vision, misjudgment of depth and/or misjudgment of position.

Density matching
Unequal tints in the lenses can lead to misjudging of the distance of moving objects, which constitutes a hazard in driving and some other circumstances.

Uniformity of colour
Non-uniform lenses can mean differences in density between pairs of lenses, other than at the usual measurement point. (See density matching above)

Other failures

Labelling
Many sunglasses do not carry labels in accordance with the specifications in the standard. Often the labelling on swing tags is detached from the glasses after leaving the distributor's possession. Apart from those that

require warning labels, incorrect or absent labelling does not constitute a significant hazard.

Obscuring of warning labels
The standard also specifies that warning labels must be readily visible and therefore not covered by other labels such as price stickers. Such a breach may be the responsibility of the retailer.

Frames and assemblies
Need to be free of features likely to cause damage during normal use, eg sharp edges. In general terms, these specifications do not involve significant hazards. Other failures, such as impact resistance of the lens, may constitute a serious hazard.

Other lens requirements

The standard sets performance requirements for the following two factors and calls for warning labels if the requirements are not met.

Red signal visibility factor
High values indicate need for 'colour defective' warning label; low values require the 'driving warning label as they impeded detection of red lights.

Violet colouration factor
Low values indicate need for a 'driving' warning label, as with red signal.

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Attachment B

Mandatory standards for sunglasses and fashion spectacles

Summary of ACCC enforcement action

Examples of ACCC enforcement action in relation to the mandatory standard include:

In October 2001 the ACCC

obtained declarations and injunctions in the Federal Court, Perth, to settle actions against two importers of sunglasses and fashion spectacles, Monza Imports Pty Ltd and Apollo Optical (Aust) Pty Ltd. The importers had breached the Trade Practices Act by supplying two brands of sunglasses and fashion spectacles which did not comply with the mandatory safety standard. The SPY ISIS sunglasses and CAB 55 002 fashion spectacles failed to comply with the standard as the lenses were too small, not meeting the minimum field of view requirements. When contacted by the ACCC regarding non-compliance, both suppliers immediately notified all retailers to withdraw the products from sale. Monza and Apollo also agreed to publish product safety notices in newspapers and magazines and provide in-store notices alerting consumers to the failure of the sunglasses and spectacles to meet field of view requirements and offering a full refund.

In November 2000, Spotlight Promotions Pty Ltd, a Queensland based promotional merchandise supplier, recalled sunglasses that failed to comply with the mandatory standard. Testing by an accredited testing authority, Unisearch, showed that the sunglasses could cause blurred vision and misjudgement of depth, position or objects. The company responded quicklly and cooperatively when requested by the ACCC to provide a product safety recall notice and provide refunds to consumers. Spotlight also provided the ACCC with court-enforceable undertakings to implement a corporate compliance program to ensure the likelihood of repeat conduct was minimised.

In February 1998, penalties totalling $25 000 and costs of $1500 were ordered against MNB Variety Imports Pty Ltd, an importer and wholesaler, for supplying swimming aids and sunglasses which failed to comply with the relevant mandatory standards. The 'Sundance' style of sunglasses supplied by MNB failed to comply with the field of view, refractive power, density matching and labelling provisions of the sunglass standard.

In November 1977, following ACCC product safety surveys, both a Melbourne and Sydney based sunglass distributor published product safety recall notices for some 30 models of sunglasses. Some of the non-complying sunglasses required a warning for defective colour vision and/or the warning about not being suitable for driving. In other cases the field of view was too small or had lens properties that could cause blurred vision and misjudgement of depth or distance. The companies offered consumers refunds or replacements of the sunglasses that did not comply with the standard.

During October and November 1996 the ACCC conducted a random survey of sunglasses from a variety of outlets in Perth, Brisbane and Adelaide. Several pairs failed to meet the standard. After raising its concerns with the suppliers of the sunglasses the ACCC accepted court-enforceable undertakings from nine suppliers in Queensland and Western Australia. The suppliers undertook to cease supply of the sunglasses, to withdraw all remaining supplies from sale, to implement compliance programs and, in some cases, to place recall notices

in newspapers. In SA three companies acted quicklly to rectify the problems identified by the ACCC.

In October 1996 the ACCC instituted proceedings against Hungry Jack's seeking corrective advertising in relation to the sale of 'Shades' sunglasses which it alleged did not meet the mandatory standard because they did not carry a warning that they were not suitable for driving. It was also alleged that previous corrective advertising by Hungry Jacks was inadequate. Hungry Jacks was ordered to undertake further corrective advertising in newspapers and on television offering refunds to consumers.

In February 1996, following a survey of Sydney retail outlets, 26 styles of sunglasses were recalled from sale after failing tests conducted on behalf of the ACCC. A variety of breaches were found including absence of warning labels and failures of the field of view, density matching and uniformity of colour requirements. After contact by the ACCC the suppliers removed the sunglasses from sale immediately and published advertisements in major daily metropolitan newspapers recalling them.

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Photochromic and Color Lenses

By Liz DeFranco, ABOC, NCLC

Photochromic lenses change from light to dark depending on the amount of ultraviolet light they are exposed to. Early photochromics were strictly glass lenses, but today, you can choose from regular plastic, polycarbonate and high-index glass and plastic.

Each Brand Offers Different Advantages

Thirty-five years after their invention, traditional **PhotoGray and PhotoBrown** lenses from Corning Medical Optics are still on the market. As their names suggest, the lenses are available in either gray or brown colors that are light enough to wear indoors and darken to a sunglass shade when exposed to ultraviolet light.

The active ingredient that causes the lenses to transform is called silver halide and is mixed evenly throughout the lens. This means the whole lens will change when exposed to light. It also means that if a particularly strong prescription is made, the strongest, thickest part of the lens will be darker than the thinner parts. Also, if there is a large difference in prescription between the two eyes, the lens with the stronger prescription will be darker than the weaker one.

Corning has updated its offerings to include **Thin & Dark** photochromic glass lenses, which are up to 30 percent lighter in weight than traditional glass lenses and also thinner. These lenses are said to change from clear eyeglass to dark sunglass lenses in 60 seconds. Thin & Dark lenses are also available in gray and brown.

Corning's newest photochromics are **SunSensors** mid-index gray and brown plastic lenses. A bit lighter in weight and thinner than regular plastic, these lenses have photochromic molecules mixed throughout the material, rather than just in the top layer. However, unlike their glass counterparts, SunSensors change within 60 seconds to a uniform color density throughout the lenses, regardless of the prescription or lens thickness, according to the company.

ColorMatic Extra from Rodenstock is another mid-index plastic photochromic line. A photochromic dye is mixed throughout these gray lenses. ColorMatic Extra lenses can be tinted to alter the color or darken the lenses.

An example of photochromic lenses. Photos provided by Transitions.

In addition, Hoya Lens makes **Sungray** Lenses, mid-index plastic photochromics with UV-activated color-changing molecules blended throughout the lens material. They can also be tinted.

Transitions lenses are available for nearly every lens design, refractive index, and prescription. Performance features include advanced variable-tint technology that allows rapid darkening when you go outside (and rapid return to clear when you go in), and 100 percent UV protection. They come in regular, lightweight plastic materials as well as in high-index plastic and polycarbonate. They have a front-surface coating that changes color (to gray or brown) when exposed to ultraviolet light. The changeable coating means that the color darkens evenly regardless of lens prescription or thickness.

Transitions also makes a few niche products including for **Drivewear**, which features a lens that remains dark behind the windshield of a vehicle. As a general rule, photochromic lenses won't darken behind the windshield because the glass blocks out the UV rays that cause the lenses to change color.

Transhades from KB Co. (a totally different product than Transitions) are plastic polarized lenses that are also photochromic. They come in glass as well as plastic, and in gray and brown. Their polarization properties make them especially comfortable when they are worn in situations in which glare is a problem. Plastic Transhades can be tinted to make them darker or to alter the lens color. The glass lenses are also available in copper, a good driving color.

Medical Applications

Beyond the convenience of having lenses that can be worn both indoors and outdoors, some photochromic lenses also have medical applications. Corning's CPF family consists of glass photosensitive lenses with colors in the red family. They are used to enhance the vision of patients who have various ocular pathologies. Doctors who specialize in low vision are familiar with these lenses and can help patients determine which color will be the most helpful.

Another glass photochromic lens that is designed for use by individuals who have beginning-to-moderate light sensitivity because of various ocular conditions is Corning's

GlareCutter. This is a darker, more cosmetically pleasing brownish-red that allows a precise level of blue light to "leak" through the lens, thus preserving a more natural color scene for the wearer than the more reddish CPF lenses.

Lenses with Tints

As opposed to the changeable photochromics, another option in colored lenses is a tint, which remains constant at all times. Tints are available on plastic as well as glass lenses and can be had in almost any color of the rainbow. Lighter, fashion tints are used primarily for cosmetic purposes to enhance a wearer's looks. Darker tints allow the wearer to use the lenses as sunglasses.

Typically, fashion tints are applied in light pink, brown or gray, while sunglasses are usually gray or brown. A tint can be solid, when the entire lens is the same color, or gradient, which is a gradual fade from dark to light, usually fading from the top down.

Other colors can be applied to lenses for different purposes:

Yellow, sometimes referred to as a "blue-blocker" because the color keeps blue light from entering the lens, is often the color of choice for target shooters because it decreases haze and makes objects appear sharper, with more contrast.

Green, or its cousin G-15 (the Ray-Ban lens color), is sometimes used as a sunglass, though brown and gray are the most popular sun shades.

Red is a very uncomfortable color to look through, though it does have applications for certain ocular pathologies. However, some people enjoy seeing the world through "rose-colored glasses."

Tints are applied to plastic lens materials through a process of absorption. The lenses are immersed into a warm color bath, and depending on the length of time they sit in the tank, emerge in varying shades of darkness. A lens that requires only a light tint will go into the bath for just a few minutes, while a lens that is meant to be sunglass-dark will stay in for quite some time.

Glass lenses may be manufactured with the color distributed throughout the lens material, or a tint is applied as a coating in a vacuum chamber after fabrication.

[Page updated March 2007]

250 million people worldwide are blind or visually impaired simply because they don't have access to an eye exam and a pair of glasses. Learn how you can help.